

Anticancer Activity Found in Berry Extracts



Strawberries, blueberries, and raspberries contain chemicals found to protect cultured cells against cervical and breast cancer.

That's a new finding from Agricultural Research Service plant pathologist David E. Wedge at ARS' Natural Products Utilization Research Unit in Oxford, Mississippi. He is working with Lyndon L. Larcom, Department of Microbiology and Molecular Medicine, Clemson University-South Carolina, along with scientists at the Thad Cochran National Center for Natural Products Research, University of Mississippi-Oxford, and the ARS Small Fruit Research Station, Poplarville, Mississippi.

Cervical cancer, the third most common type of cancer in women, affects about 2 to 3 percent of all women over age 40. One in eight or nine American women will develop breast cancer at some point in her life, based on full life expectancy. After skin cancer, breast cancer is the most frequently diagnosed cancer in U.S. women and is second only to lung cancer in cancer-related deaths.

"The number of these fatalities may be reduced by dietary intervention," says Wedge. "Research on dietary influences on cancer has led to identifying nearly 1,000 phytochemicals with cancer-prevention roles. Yet, fewer than 25 have been tested in clinical trials."

Nutraceuticals are foods, or parts of foods (phytochemicals), that provide medical or health benefits—including prevention and treatment of disease.

Freeze-dried fruits of two cultivars of blueberry (Tribue and Premier) and strawberry (Carlsbad and Sweet Charlie) were sequentially extracted with several solvents. Clemson researchers tested these extracts against cultures of two aggressive cervical cancer cell lines (CaSki and SiHa) and two breast cancer cell lines (MCF-7 and T47-D) with different requirements for estrogen.

They added extracts to the growing cancer cell cultures, incubated them for 48 hours, and then assessed the cells' metabolic activity by measuring the activity of enzymes involved in the cellular reactions for energy production.

"Extracts from strawberry and blueberry significantly decreased the growth of cervical and breast cancer cells," says Wedge. "Extracts of Sweet Charlie strawberry were most effective in decreasing the growth of breast cancer cells, and it

did so by 77 percent. Premier blueberry was most effective—81 percent—at decreasing the growth of cervical cancer cells."

Blueberry extract showed more growth inhibition of cervical cells than of breast cancer cells.

"Carlsbad strawberry inhibited the growth of cervical cancer cells by 76 percent but had less effect—about 34 percent—on reducing breast cancer. Sweet Charlie strongly inhibited growth—by about 54 percent—of both breast cancer lines tested," he says.

Preliminary results obtained by Larcom indicate that other blueberry and raspberry components significantly suppress cancer-causing cell mutations produced by direct-acting and metabolically activated carcinogens.

Phytochemicals available from foods may affect production and early growth of tumors in humans by altering how cells respond to genetic damage or a carcinogenic agent. The study of fresh fruits for use in dietary prevention of, intervention in, and recovery from cancer is ongoing at ARS' Oxford lab and Clemson University.

Future studies lie in identifying specific phytochemicals active against each cell line. These studies support information that phytochemicals from fruits in our diet may inhibit initiation and proliferation of some types of cancer.

"This research should provide important data and help clarify anticancer and nutraceutical benefits of small fruits that have been attributed to some phytochemicals," says Wedge.

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